Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application

Listing of Claims:

1. (Currently Amended) An electrically-pumped terahertz (THz) frequency radiation source comprising:

an unstrained bulk optical gain material formed substantially of at least one group IV element and doped with at least one dopant having an intra-center transition frequency in a range of about 0.3THz to 30THz;

a first electrode electrically coupled to the unstrained bulk optical gain material; and

a second electrode electrically coupled to the unstrained bulk optical gain material.

2. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, wherein the unstrained bulk optical gain material includes at least one of:

a crystalline material formed of one group IV element;

a crystalline material formed of an alloy of group IV elements; or

an amorphous material formed of a group IV element.

3. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, wherein the unstrained bulk optical gain material is selected from a group consisting of: diamond, crystalline silicon, crystalline germanium, crystalline silicon carbide, crystalline silicon germanium, polycrystalline silicon, amorphous diamond, amorphous silicon, and amorphous germanium.

4. (Original) The electrically-pumped THz frequency radiation source of claim 1, wherein the at least one dopant is one of a group III element or a group V element.

5. (Original) The electrically-pumped THz frequency radiation source of claim 1, wherein the at least one dopant is a shallow depth dopant.

6. (Original) The electrically-pumped terahertz frequency radiation source of claim 1, wherein the at least one dopant is selected from a group consisting of: boron, phosphorus, gallium, antimony, arsenic, and aluminum.

7. (Original) The electrically-pumped THz frequency radiation source of claim 1, wherein:

the at least one dopant includes a first co-dopant of a first carrier type and a second co-dopant of a second carrier type to compensate the first co-dopant; and

a first dopant concentration of the first co-dopant is at least five times a second dopant concentration of the second co-dopant.

8. (Previously Presented) An electrically-pumped THz frequency radiation source comprising:

an optical gain material formed substantially of at least one group IV element and doped with at least one dopant having an intra-center transition frequency in a range of about 0.3THz to 30THz,the at least one dopant including;

a first co-dopant of a first carrier type having a first intra-center transition frequency; and

a second co-dopant of the first carrier type having a second intra-center transition frequency;

a first electrode electrically coupled to the optical gain material; and

a second electrode electrically coupled to the optical gain material:

wherein:

a first dopant concentration of the first co-dopant is approximately equal to a second co-dopant concentration of the second dopant; and

the first intra-center transition frequency is not equal to the second intra-center transition frequency.

9. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, wherein a resistivity of the unstrained bulk optical gain material is in the range of about 1 to 10 ohm-cm.

10. (Original) The electrically-pumped THz frequency radiation source of claim 1, wherein:

the first electrode is formed of at least one of aluminum, gold, silver, copper, nickel, titanium, tungsten, platinum, germanium, polyaniline, or polysilicon; and

the second electrode is formed of at least one of aluminum, gold, silver, copper, nickel, titanium, tungsten, platinum, germanium, polyaniline, or polysilicon.

11. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, wherein the first electrode forms a Schottky barrier contact with the unstrained bulk optical gain material.

12. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, wherein the first electrode forms a substantially ohmic contact with the unstrained bulk optical gain material.

13. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, further comprising:

a first reflective element and a second reflective element substantially parallel to the first reflective element, the first reflective element and the second reflective element being arranged on either side of the unstrained bulk optical gain material to form a Fabry-Perot laser cavity;

wherein;

a reflectivity of the first reflective element is less than 100%; and

the electrically-pumped THz frequency radiation source emits coherent THz frequency radiation through the first reflective element.

14. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, wherein the unstrained bulk optical gain material is coupled to a substrate.

15. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 14, wherein:

the substrate includes a distributed feedback element;

the distributed feedback element is optically coupled to the unstrained bulk optical gain material; and

the electrically-pumped THz frequency radiation source emits coherent THz frequency radiation.

16. (Currently Amended) The electrically-pumped THz frequency radiation source of claim 1, wherein the unstrained bulk optical gain material is formed as a doped region within a substantially undoped material formed substantially of at least one group IV element.

17-29 (Canceled)

30. (New) An electrically-pumped terahertz (THz) frequency radiation source comprising:

a bulk amorphous optical gain material formed substantially of at least one group IV element and doped with at least one dopant having an intra-center transition frequency in a range of about 0.3THz to 30THz;

a first electrode electrically coupled to the bulk amorphous optical gain material; and

a second electrode electrically coupled to the bulk amorphous optical gain material.

31. (New) The electrically-pumped THz frequency radiation source of claim 30, wherein the bulk amorphous optical gain material is formed of a group IV element.

32. (New) The electrically-pumped THz frequency radiation source of claim 30, wherein the bulk amorphous optical gain material is selected from a group consisting of: amorphous diamond, amorphous silicon, and amorphous germanium.

33. (New) The electrically-pumped THz frequency radiation source of claim 30, wherein a resistivity of the bulk amorphous optical gain material is in the range of about 1 to 10 ohm-cm.